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Sampling and Analysis Plan for the Post-Decontamination Characterization of the Process Waste Lines from INTEC Tank Farm Facility Tanks WM-182 and WM-183

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Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC

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ABSTRACT

The *Sampling and Analysis Plan for the Post-Decontamination Characterization of the Process Waste Lines from INTEC Tank Farm Facility Tanks WM-182 and WM-183* provides information about the project description, project organization, and quality assurance and quality control procedures that will be used to generate characterization data for a decontaminated process waste lines that have been removed from the Idaho Nuclear Technology and Engineering Center Tank Farm Facility. This document is used to specify the procedures for obtaining the data of known quality required by the closure activities for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility. The data from this sampling effort will be used to support Idaho Hazardous Waste Management Act/Resource Conservation Recovery Act closure.

FOREWORD

In 1989, the U.S. Environmental Protection Agency (EPA) published *Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act* (EPA 1988). This document stated that a Sampling and Analysis Plan (SAP) consisted of two separate documents: a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). In 1998, EPA published *EPA Guidance for Quality Assurance Project Plans EPA QA/G-5* (EPA 1998), and in 2001, EPA published *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5* (EPA 2001). These recent documents expand on the guidance provided in the *EPA 1989 Guidance*. Most notably, the 1998 and 2001 documents take the elements defined in the *EPA 1989 Guidance*, which previously required both an FSP and a QAPP to implement, and combine them into one document. Thus, EPA's 1998 and 2001 direction implies that only a single QAPP document is required for each sampling and analysis activity. To alleviate confusion between the old and new nomenclature, this SAP includes all the elements required in a QAPP and in an FSP, regardless of which EPA guidance is followed. To demonstrate this compliance, and to aid readers in locating specific information of interest, a cross-reference among the *EPA 1989 Guidance*, the *EPA 1998 Guidance*, the *EPA 2001 Requirements*, and this document is provided.

The *Sampling and Analysis Plan for the Post-Decontamination Characterization of the Process Waste Lines From INTEC Tank Farm Facility Tanks Wm-182 and Wm-183* addresses the collection of data of known quality as required by the EPA and the Idaho Department of Environmental Quality for Idaho Nuclear Technology and Engineering Center Tank Farm Facility closure activities at the Idaho National Engineering and Environmental Laboratory.

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ACRONYMS

AA	alternative action
ALARA	as low as reasonably achievable
ARDC	Administrative Record and Document Control
CFR	Code of Federal Regulations
COC	chain of custody
DEQ	Department of Environmental Quality
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DQA	data quality assessment
DQO	data quality objective
EPA	Environmental Protection Agency
ESH&Q	environment, safety, health, and quality
FSP	Field Sampling Plan
FTL	field team leader
HASP	health and safety plan
HLW	high-level waste
HSO	health and safety officer
HWMA	Idaho Hazardous Waste Management Act
IH	industrial hygienist
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
JSS	job-site supervisor
LDUA	light duty utility arm
MCP	management control procedure
OSHA	Occupational Safety and Health Administration

PEW	process equipment waste
PM	project manager
PQAO	project quality assurance officer
PRD	program requirements directives
PSQ	principal study question
QA	quality assurance
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	quality control
RAL	Remote Analytical Laboratory
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
SAP	Sampling and Analysis Plan
SBW	sodium-bearing waste
SC	sample custodian
SMO	Sample Management Office
SOP	standard operating procedure
SOW	statement of work
TFF	Tank Farm Facility
TPR	technical procedure
U.S.	United States
WGS	Waste Generator Services
WTS	waste technical specialist

SAMPLING AND ANALYSIS PLAN FOR THE POST-DECONTAMINATION CHARACTERIZATION OF THE PROCESS WASTE LINES FROM INTEC TANK FARM FACILITY TANKS WM-182 AND WM-183

1. PROJECT DESCRIPTION

1.1 Purpose

This sampling and analysis plan (SAP) describes the sampling, analysis, and quality assurance and control (QA/QC) procedures to be used for the post-decontamination characterization of the process waste lines for Tanks WM-182 and WM-183 at the Idaho Nuclear Technology and Engineering Center (INTEC) Tank Farm Facility (TFF). The collection and analysis of rinsate samples is designed to verify that triple rinsing the process waste pipe with water is an adequate method of decontamination for clean closure.

This SAP is a combined Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) in accordance with United States (U.S.) Environmental Protection Agency (EPA) guidance (EPA 1998, 2001). The elements of a QAPP present the activities, organization, and QA/QC protocols to achieve the data quality objectives (DQOs) of the sampling and analysis effort. The elements of an FSP specify sampling and analyses required to ensure compliance with the regulatory requirements for closure as defined by the Idaho Hazardous Waste Management Act (HWMA) (State of Idaho 1983) and the Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901, 1976), and with U.S. Department of Energy (DOE) closure requirements. This SAP is based on the requirements stated in the EPA *Guidance for Quality Assurance Project Plans*[a] (EPA 1998). This SAP also will ensure compliance with the QA/QC requirements of DOE's management and operations contractor, Bechtel BWXT Idaho, LLC; EPA Region 10; the DOE Idaho Operations Office (DOE-ID); DOE Headquarters; and the Idaho Department of Environmental Quality (Idaho DEQ). This plan will serve as the governing document for all activities conducted in support of the post-decontamination characterization of the process waste lines that have been removed from tanks WM-182 and WM-183.

1.2 Background

The TFF includes eleven belowground 300,000-gal and 318,000-gal tanks (hereafter referred to in this document as 300,000-gal tanks) and four 30,000-gal tanks. Each tank, numbered WM-180 through WM-190, is enclosed within a concrete vault. The TFF was designed primarily to receive liquid wastes from nuclear fuel reprocessing operations at the Idaho Chemical Processing Plant, now called INTEC. Reprocessing operations to recover ^{235}U began in 1953 and ceased in 1992. The TFF currently receives liquids from the process equipment waste (PEW) evaporator; the liquids are derived from waste produced by plant operations such as fuel storage, sample analysis, off-gas cleanup, and equipment and facility decontamination.

a. To demonstrate compliance to EPA requirements and guidance documents, as stated in the Foreword, and to aid readers in locating specific information of interest, a cross-reference between the *EPA 1989 Guidance* document, the *EPA 1998 Guidance* document, the *EPA 2001 Requirements*, and this document is provided as Appendix A.

Because the tanks at the TFF do not meet HWMA/RCRA secondary containment requirements or current structural seismic standards, the TFF is to be closed in phases beginning in 2003. The first phase of the closure will include Tanks WM-182 and WM-183. This first phase will also serve as a proof-of-process demonstration of the waste removal, decontamination, and sampling techniques.

1.3 History of Tank WM-182 and WM-183

Tanks WM-182 and WM-183 were built between 1954 and 1955 and were used primarily to store first-cycle raffinate wastes resulting from the processing of aluminum and zirconium nuclear fuels. Since beginning service in 1956, approximately 1,604,100 gal of Tank WM-182 waste was calcined during five calcination campaigns.

Tank WM-183 has been filled and emptied to heel level three times and has contained aluminum and stainless-steel fuel reprocessing raffinates. Sodium-bearing waste (SBW), mixed low-level waste (MLLW), and low-level waste (LLW) have been introduced to the TFF (including Tanks WM-182 and WM-183). MLLW and LLW were sent to the PEW evaporators, and the bottoms from the evaporators were subsequently discharged to the TFF.

Tank WM-183 has contained a greater variety of waste, and the tank heel will likely have more precipitated solids than Tank WM-182. Tanks WM-182 and WM-183 now contain 10,800 gal and 12,100 gal of SBW, respectively (DOE-ID 2001).

1.4 Purpose of Sampling

The overall purpose of the post-decontamination sampling of the WM-182 and WM-183 process waste lines described in this SAP is to support decisions about whether or not the TFF may be clean closed under HWMA/RCRA by:

- Determining the effectiveness of triple rinsing TFF process waste piping with water. Wastes presently in the tanks are listed wastes and hazardous waste by the toxicity and corrosivity characteristic. It must be determined that the process waste lines do not contain a hazardous waste. Therefore, the mean characteristic of a water rinsate collected from the decontaminated (triple-rinsed) process waste lines must be shown to be less than the toxicity characteristic (40 Code of Federal Regulations [CFR] 261.24 Table 1, 2001).

- Determining that any residual left in the process waste lines following decontamination does not exceed the parameter-specific action levels specified in the *Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tanks WM-182 and WM-183* (DOE-ID 2001), hereafter referred to as the HWMA/RCRA Closure Plan.

The process waste lines in the WM-182 and WM-183 tank systems have carried acidic waste in solution and have routinely been flushed after waste transfer with either acid or an acid and water flush. During closure of the tank systems, the tanks will be triple rinsed with water to remove loose residual waste. Sections of horizontal and vertical process waste line (2” PUA 1033) have been removed from Tank WM-182. This is the process waste line that originates with steam jet WM-582-1A. Other line(s) will be removed from Tank WM-183 when decontamination equipment is placed in the tank. Samples from the decontaminated process waste lines will be collected and the data will be used to represent the effectiveness of triple rinsing all of the lines remaining in the WM-182 and WM-183 tank systems. The pipe to be sampled was removed (with a welding torch) from the system. Prior to sampling, sections of the pipe, between two and six inches long will be removed from each end using a wheel pipe cutter. Two

rinsate samples from the line will be collected and analyzed for metals. Because the operations associated with decontamination of the process waste lines very efficiently removed organic constituents remaining in the lines, the rinsate samples collected from these lines will only be analyzed for metals. In addition, a section of new and unused line, with approximately the same dimensions as the decontaminated process waste line, will be sampled in an equivalent manner. The purpose of sampling the section of new and unused pipe is to provide data for comparison of metals contributed from a new pipe to those contributed from a decontaminated process waste line. The TFF waste is hazardous by the characteristic of corrosivity. The rinsate sample will not include pH analysis because the pipe is dry initially and addition of the rinse water would dilute acidic properties significantly.

1.5 Analytical Laboratory

The laboratory chosen for conducting the analyses will have the appropriate level of qualified personnel, the appropriate instrumentation, an approved quality assurance plan (QAP), approved analytical methods, and appropriate internal standard operating procedures (SOPs) to perform the required analyses. The selected laboratory will be approved for use on INEEL samples as documented by their inclusion on the INEEL-approved suppliers list. The QAPs and SOPs for the laboratory (or laboratories) selected for performing the required analyses will be available for review by project personnel.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES

The WM-182 and WM-183 tank system closure has a clearly defined project organization. This will ensure that project closure objectives, data gathering and reporting, data evaluation and interpretation, closure design, and operational safety meet INEEL requirements. Table 1 lists project personnel and their responsibilities. The table is not intended to imply that a separate individual is required for each project role listed. One individual may perform more than one project role. The following subsections outline the specific duties of the project personnel associated with each role throughout the post-decontamination characterization effort.

2.1 Project Manager

The project manager (PM) will ensure that all activities conducted during the project comply with INEEL management control procedures (MCPs) and program requirements directives (PRDs), and all applicable requirements of the U.S. Occupational Safety and Health Administration (OSHA), EPA, DOE, U.S. Department of Transportation, and State of Idaho. The PM coordinates all document preparation and all field and laboratory activities, data evaluation, risk assessment, dose assessment, and closure design activities. The PM is responsible for the overall work scope, schedule, and budget.

Table 1. Key project responsibilities and responsible personnel.

Project Role	Responsible Official	Telephone Number
Project manager	Keith Quigley	526-3779
Environmental Affairs closure project manager	Susan Evans	526-0186
Operations manager	Frank Ward	526-3862
Project quality assurance officer	TBD[a]	
Job-site supervisor	TBD	
Field team leader	TBD	
Industrial hygienist	TBD	
Health and safety officer	TBD	
Radiological control technician	TBD	
Sampling team member[b]	TBD	
Laboratory manager	TBD	
Laboratory quality assurance officer	TBD	
Laboratory sample custodian	TBD	
Waste Generator Services – Waste Technical Specialist	TBD	
Data validation chemist	TBD	528-6608
Data quality assessment chemist/statistician	TBD	528-6608
Data storage administrator	High-Level Waste Program	

a. TBD = To be determined.

b. All sampling team members will be identified before sampling begins.

The PM is responsible for field activities and for all personnel (including craft personnel) assigned to work at the project location. The PM will serve as the interface between operations and project personnel and will work closely with the sampling team at the site to ensure that the objectives of the project are accomplished in a safe and efficient manner. The PM will work with all other identified project personnel to accomplish day-to-day operations at the site, identify and obtain additional resources needed at the site, and interact with the INTEC environment, safety, health, and quality (ESH&Q) oversight personnel on matters regarding health and safety.

2.2 Environmental Affairs Closure Project Manager

The Environmental Affairs (EA) closure project manager is responsible for regulatory oversight of the project. The EA Closure PM ensures that closure documentation complies with regulatory requirements and acts as the main resource for project communication to the independent Professional Engineer (PE) who certifies closure. Any deviation from the requirements specified in closure plan documentation will be communicated to the PE through the EA Closure PM.

2.3 Operations Manager

The TFF operations manager is responsible for all work that is accomplished in the facility. This includes ensuring that work activities are scheduled, adequate safety and health support personnel are available, and that the work performed is completed by personnel that are adequately trained to accomplish the work. The operations manager is a key function of the Integrated Safety Management System at the INEEL.

2.4 Project Quality Assurance Officer

The project quality assurance officer (PQAO) will report directly to INEEL management and will be organizationally independent for all WM-182 and WM-183 post-decontamination tank system and process waste line characterization and closure activities. The PQAO also will be responsible for the control and implementation of all QA/QC actions conducted during post-decontamination characterization and subsequent closure activities.

These actions include:

- Conducting QA oversight of all reporting and all project data gathering efforts
- Conducting QA oversight for all laboratory analysis and data reporting
- Conducting QA oversight for all data validation and data evaluation
- Identifying and reporting any deviations from project QA objectives
- Identifying and implementing any necessary corrective actions
- Monitoring the performance of all field activities (sample collection, decontamination, and transport)
- Conducting system and performance audits, if necessary
- Preparing and submitting QA reports to management.

2.5 Job-Site Supervisor

The job-site supervisor (JSS) serves as the representative for the High-Level Waste (HLW) Program at the site. The JSS manages field activities, craft personnel, and other personnel assigned to work at the site. The JSS is the interface between operations and project personnel and works closely with the sampling team at the site to ensure that the objectives of the project are accomplished in a safe and efficient manner. The JSS and the PM will work together to accomplish day-to-day operations at the site, identify and obtain additional resources needed at the site, and interact with the health and safety officer (HSO), industrial hygienist (IH), and radiological control technician (RCT) on matters regarding health and safety. The JSS will be informed about any health and safety issues that arise at the site and may stop work at the site if an unsafe condition exists. The JSS will participate in all daily pre-job briefings. The duties of the JSS may be combined with the duties of the field team leader (FTL) and performed by one individual.

2.6 Field Team Leader

The FTL will be the INEEL representative at the site with responsibility for the safe and successful completion of sampling the post-decontamination WM-182 and WM-183 tank heels and the process waste line(s). The FTL works with the JSS, the RCT, and the field team to manage field sampling operations and to execute the SAP. The FTL enforces site control, documents activities, and may conduct the daily safety briefings at the start of the shift. Health and safety issues may be brought to the attention of the FTL. As previously stated, the duties of the FTL may be combined with the duties of the JSS and performed by one individual.

If the FTL leaves the site, an alternate will be appointed to act as the FTL. The identity of the acting FTL will be conveyed to site personnel, recorded in the FTL logbook, and communicated to the facility representative, when appropriate.

2.7 Industrial Hygienist

The IH is the primary source for information regarding hazardous and toxic agents at the site. The IH assesses the potential for worker exposures to hazardous agents according to applicable procedures, MCPs, and accepted industry IH practices and protocol. By participating in site characterization, the IH assesses and recommends appropriate hazard controls for the protection of site personnel and operates and maintains personnel sampling and monitoring equipment. The IH also recommends and assesses the use of personnel protective equipment in the health and safety plan (HASP) or other health and safety documentation such as safe work permits or radiological work permits.

In the event of a general area evacuation, the IH, in conjunction with other recovery team members, will assist the JSS and PM in determining whether or not conditions exist for safe site reentry. Personnel showing signs and symptoms of health effects resulting from possible exposure to hazardous agents will be referred to an Occupational Medical Program physician by the IH, the individual's supervisor, or the HSO. The IH may have other duties at the site as specified in other sections of the HASP, in PRDs, or MCPs. During emergencies involving hazardous materials, airborne sampling and monitoring results will be coordinated with members of the Emergency Response Organization.

2.8 Health and Safety Officer

The HSO is the person assigned to the site who serves as the primary contact for health and safety issues. A specific individual designated as the HSO may not be necessary because of the current health,

safety, and radiological controls staff at INTEC. The PM will determine if an HSO is needed for this project. The HSO advises the JSS and FTL on all aspects of health and safety. The HSO is authorized to stop work at the site if any operation threatens worker or public health or safety. The HSO is authorized to verify compliance with the HASP, conduct inspections, require and monitor corrective actions, and monitor decontamination procedures and require corrections, as appropriate. The HSO is supported by environment, safety and health (ES&H)/QA professionals at the INEEL (i.e., safety engineer, IH, RCT, radiological engineer, environmental coordinator, and facility representative) as necessary.

Persons assigned as the HSO (or as an acting HSO) must be qualified (in accordance with 29 CFR 1910.120(a)(3) [2001]) to recognize and evaluate hazards and will have the authority to take or direct actions to ensure that workers are protected. If the HSO must leave the site, an alternate, the IH, or the FTL will be appointed by the HSO as acting HSO. The identity of the acting HSO will be recorded in the appropriate logbooks, and site personnel will be notified.

2.9 Radiological Control Technician

The RCT is the primary source for information and guidance on radiological hazards and will be present at the site during all operations. Responsibilities of the RCT include radiological surveying of the site, equipment, and samples; providing guidance for radioactive decontamination of equipment and personnel; and, if significant radiological contamination occurs, accompanying any affected personnel to the nearest INEEL medical facility for evaluation. The RCT notifies the JSS of any radiological occurrence that must be reported as directed by PRD-183, "INEEL Radiological Control Manual," (INEEL 2000a). The RCT may have other duties at the site as specified in other sections of the HASP, in PRDs, or MCPs.

2.10 Sampling Team Members

The field team consists of the sampling team members, who are fully trained and skilled in the use of a pipe wheel cutter and collection of rinsate samples being poured from a radioactively contaminated pipe; a decontamination team; and the RCT. The sampling team members will be responsible for collecting samples in sufficient numbers and volumes to meet the requirements presented in this SAP. The RCT will perform direct surveys of the of the pipe section before it is cut and sampled and of the samples just before they are placed in the transport container or shipping cooler. The sampling team, under direct supervision of the HSO and the RCT, will be responsible for sampling equipment removal from the sampling area to a decontamination facility at the end of the sampling event. Decontamination of the sampling equipment will be performed according to a specific protocol. The sampling team will then ensure that any reusable sampling equipment is readied for another sampling event according to the appropriate SOP.

Sampling team members must be knowledgeable and experienced in use of a pipe wheel cutter and collection of rinsate samples that are poured from a radioactively contaminated pipe, as well as in requirements of INTEC and INEEL ES&H procedures and policies. Sampling personnel must also be familiar with the TFF systems and components.

2.11 Laboratory Manager

The laboratory manager will serve as the principal point-of-contact for coordinating laboratory activities. The responsibility of coordination with the field team may be delegated to a laboratory project manager within the laboratory organization. The laboratory manager will have ultimate responsibility for

laboratory technical quality, cost control, and laboratory personnel management and for ensuring that the samples are analyzed and data reported on schedule.

2.12 Laboratory Quality Assurance Officer

The laboratory QA officer will evaluate all laboratory-generated data before it is released to determine if:

- Instrument calibrations were performed in accordance with the analytical statement of work (SOW) provided to the laboratory
- All method QC analyses comply with the requirements of the SOW and analytical methods
- The data-reporting format complies with the requirements stipulated by the project in the SOW.

The laboratory QA officer will notify the PM and the PQAO of all non-compliances and will seek immediate corrective action through the PQAO.

2.13 Laboratory Sample Custodian

The laboratory sample custodian (SC) will be responsible for maintaining sample custody, assigning laboratory identification numbers, and storing samples. To ensure compliance with project procedures, the SC will review all chain of custody (COC) forms, accompanying field radiological surveys, and all sample container identifications. In the event of field sampling or field radiological survey errors, the SC will notify the FTL and field team members of the error and seek to rectify the error immediately. All non-compliances will be documented in the laboratory logbook and copies provided to the laboratory QA officer and the PQAO to ensure that the appropriate corrective actions have been developed. Discrepancies in sampling documentation are documented in the COC or on a sample-receiving checklist, which becomes part of the data package.

2.14 Waste Generator Services – Waste Technical Specialist

The INEEL Waste Generator Services (WGS) waste technical specialist (WTS) will ensure disposition of non-sample waste material is in compliance with the approved HWMA/RCRA Closure Plan (DOE-ID 2001) and that applicable paperwork is completed. All samples and analysis wastes disposed by the INEEL Analytical Chemistry Laboratory will be disposed to the PEW evaporator system through normal routes or in accordance with INEEL MCP-2864, “Sample Management” (INEEL 1999a). The WGS WTS will ensure compliance with the applicable HWMA/RCRA requirements and PRD-166, “INTEC PEW Chemical Acceptance Criteria” (INEEL 1999b).

2.15 Data Validation Chemist

Data validation is one step of the data quality assessment (DQA) process. The data validation chemist performs analytical method data validation, which is the comparison of analytical results versus the requirements established by the analytical method. The validation involves evaluation of all sample-specific information generated from the point of sample collection to receipt of the final data package from the laboratory. Data validation is used to determine whether or not the analytical data are technically and legally defensible, reliable, and meet the DQOs of the project. Additional steps of the DQA process are discussed in Section 9.3.

The final product of the validation process is the validation report, which communicates the quality and usability of the data to the decision-makers. The validation report will contain an itemized discussion of the validation process and results. Copies of the data forms, annotated by the data validation chemist for qualification of the data as discussed in the validation report, will be attached to the report.

2.16 Data Quality Assessment Chemist/Statistician

The DQA process is performed by one (or more) chemist/statistician familiar with analytical chemistry, statistical sampling designs, and statistical hypothesis testing. Steps of the DQA process involve data plotting, testing for outlying data points, and statistical hypothesis testing relative to the null and alternative hypotheses stated in the DQOs. The outcome of the DQA process is a statement that the statistical hypothesis testing suggests that the null hypothesis is accurate, that the null hypothesis has been rejected, or that not enough data exist to make a determinative conclusion based upon the hypothesis test used. In the latter case, either additional data must be collected to support the statistical hypothesis testing or the data user must make a decision with higher uncertainty than the levels expressed in the DQOs.

Data that are not necessarily invalid may be flagged during the data validation process. Flagged data are reviewed during the DQA process to determine whether the validation flags affect the intended use of the data. The determination of whether or not flagged data are used in statistical hypothesis testing is documented in the DQA report prepared by the DQA chemist/statistician.

2.17 Data Storage Administrator

The data storage administrator is responsible for maintenance of the HLW Administrative Record and Document Control (ARDC). The ARDC will be the official repository for all TFF closure project records. Upon completion of the WM-182 and WM-183 post-decontamination process waste line characterization, the PM will transfer all hard-copy information and documentation developed from the project to the HLW Program ARDC for appropriate archiving. Hard-copy information and documentation include field logbooks, field and laboratory COC forms, laboratory reports and data, engineering calculations and drawings, final design reports, data validation reports, DQA reports, and all other technical reports related to the project. Copies of all analytical data and final reports will also be retained in the laboratory files, and at the discretion of the laboratory manager or laboratory QA officer, will be stored on computer disk and in hard-copy form for a minimum of five years from point of generation. Data will be made available for retrieval by authorized project staff from the HLW Program ARDC and the laboratory archives upon request.

3. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The overall objective of the post-decontamination characterization is to obtain data to determine if decontamination activities have resulted in the TFF meeting the closure requirements as defined by HWMA/RCRA and DOE. DQOs are qualitative and quantitative statements derived from the first six steps of the EPA's DQO process (EPA 2000) that:

- Clarify the study objective
- Define the most appropriate type of data to collect
- Determine the most appropriate conditions from which to collect the data
- Specify tolerable limits on decision errors, which will be used as a basis for establishing the quantity and quality of data needed to support the decision(s) to be made using the data.

3.1 Data Quality Objectives

DQOs are discussed in the context of the DQO process as defined by *Guidance for the Data Quality Objectives Process* (EPA 2000). This process was developed by EPA to ensure that the type, quantity, and quality of data used in decision-making are appropriate for the intended application. The DQO process includes seven steps, each of which has specific outputs. The DQO process has been, and will continue to be, used for each of the sampling activities conducted during the closure activities for Tanks WM-182 and WM-183. Each of the following subsections corresponds to a step in the DQO process, and the output for each step is provided as appropriate. Because sample collection will occur at various times during the closure activity, and the data use for each sample collection activity may vary, the outputs for each DQO step will reflect these data needs and uses.

3.1.1 Problem Statement

The first step in the DQO process is to clearly state the problem to be addressed in the context of the TFF HWMA/RCRA and DOE closure activities. The intent of this step is to clearly define the problem so that the focus of the activities will be unambiguous. The appropriate outputs for this step are (1) a concise description of the problem, (2) a list of the planning team members, (3) identification of the decision-maker(s), and (4) a summary of available resources and relevant deadlines for the study. The planning team members, decision-makers, and schedule are presented in the *Idaho Nuclear Technology and Engineering Center Tank Farm Facility Conceptual DOE and HWMA/RCRA Closure Approach* (INEEL 2000b) and in the *Tier 1 Closure Plan for the Tank Farm Facility* (Portage Environmental 2001a)[b]. The problem statement is that there is a need to demonstrate that the decontamination performed in the process waste lines at Tanks WM-182 and WM-183 have resulted in closure performance objectives being met.

The mean concentrations for constituents remaining in the process waste lines after triple rinsing must be less than the toxicity characteristic contaminant levels and less than action levels stated in the

b. Portage Environmental, Inc., 2001, *Tier I Closure Plan for the Idaho Nuclear Engineering and Technology Center Tank Farm Facility at the INEEL*, INEEL/EXT-01-00576, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho (in print, expected January 2002).

HWMA/RCRA Closure Plan (DOE-ID 2001). If residual concentrations in the process waste lines that have been triple rinsed exceed the action levels, or are hazardous waste by toxicity, alternative methods to triple rinsing will be examined to achieve clean closure.

3.1.2 Decision Statement

The second step in the DQO process is to identify the decisions and the potential actions that will be affected by the data collected. This is done by specifying principal study questions (PSQs) and alternative actions (AAs) that could result from resolution of the PSQs, and by combining the PSQs and AAs into decision statements.

The objective of characterizing rinsate collected from the process waste lines is to answer the following PSQ:

- Are post-decontamination (triple rinsed with water) concentrations of metals constituents remaining in the TFF process waste lines less than the applicable action levels specified in the HWMA/RCRA Closure Plan (DOE-ID 2001).

The AAs to be taken depending on the resolution of the PSQ are as follows:

- If the concentration of any metal constituent in the rinsate sample collected from a triple rinsed section of process waste line exceeds the action levels in the specified closure plan, then a different method of decontamination and sampling may be necessary.

- If the concentration of any metal constituent in the rinsate solution collected from the process waste line results in the solution being a characteristic hazardous waste due to the toxicity characteristic, then a different method of decontamination and sampling may be necessary.

Combining the PSQ and AAs results in the following decision statement:

- Determine if decontamination by triple rinsing with water of the process waste lines in the TFF tank systems has resulted in concentrations of constituents below action levels; if not, then a different method of decontamination and sampling may be necessary.

3.1.3 Decision Inputs

The third step in the DQO process is to identify the informational inputs required to resolve the decision statement and to determine which inputs require measurement. To resolve the decision statement in Section 3.1.2, the information input needed is the identification and quantification of metal constituents present in the rinsate from a process waste line removed from the decontaminated tank systems. Then, to resolve the decision statement, concentrations of the metal constituents present in a rinsate sample collected from the section of process waste line that has been removed from the TFF must be determined.

During this third step of the DQO process, the basis for an action level is established. The action level is the threshold value that provides the criterion for choosing between AAs. The constituent-specific action levels specified in the closure plan were derived to ensure the protection of human health and the environment. For metal constituents, a description of how the action levels were derived is provided in Appendix C of the HWMA/RCRA Closure Plan (DOE-ID 2001).

3.1.4 Study Boundaries

The fourth step in the DQO process is to define the spatial and temporal boundaries of the study. The spatial boundaries define the physical extent of the study area; they may be subdivided into specific areas of interest. The temporal boundaries define the duration of the entire study or specific parts of the study. The appropriate outputs of this step are a detailed description of the spatial and temporal boundaries of the problem and a discussion of any practical constraints that may interfere with the study.

The HWMA/RCRA facility closure requirements specify that the boundaries applicable to cleanup of closed facilities are the unit boundary of the unit being closed. This sampling effort provides data for only one small component of the entire closure of the TFF. The media to be sampled to resolve the decision statement are rinse solutions collected from a section of decontaminated (triple-rinsed) and removed process waste line and a new and unused line of similar dimensions. To characterize these residuals, samples will be collected and analyzed for metals. The data from the analysis of samples of the rinse collected from the process waste line will be compared to the data from analysis of rinse collected from the new and unused section of line to determine if there is evidence metals contamination is present in unused piping. The new piping is a control, or blank, sample. The results of this sample will be subtracted from each of the two concentrations reported for the rinse samples collected from the process waste line. The difference between the results will be compared to the action levels for each constituent. The individual results will be compared to the results obtained from the new section of pipe and subsequently to the action levels.

Defining the temporal boundaries of the problem involves specifying the time frame to which the decision applies and determining when to collect data. Due to the length of time to which final decisions regarding TFF closure apply, it will not be possible to collect data over this entire period. The period within which to collect the data is determined by decontamination operations. Decontamination operations for the process waste line discussed in this SAP is complete. Therefore, sampling can commence once this SAP is approved and field logistics are completed.

In defining the study boundaries, the scale of decision-making must also be discussed. As discussed previously, the performance standards will be applied to the effects of exposure to the public by leaving tank system residuals in place. For HWMA/RCRA closure, the decisions will apply to closure of the TFF as it is defined in the HWMA/RCRA Closure Plan (DOE-ID 2001).

Other than the logistics required to ensure adequate health and safety of sampling personnel, there are no perceived practical constraints on data collection for sampling the rinse solutions from the process waste line and the new unused section of line discussed in this SAP. The preferred option for obtaining representative samples of the contents of the decontaminated process waste line and the new unused line will be:

- Capping one end of the lines with a non-metallic (e.g., plastic) cap. Filling the capped pipe with deionized water and allowing them to equilibrate for 30 minutes. Collecting samples of rinse solutions from the lines by pouring the water solution from the pipes directly into sample bottles.

The sample collection option (or options) will be chosen that provides the most representative characterization of the sample populations while adequately protecting the health and safety of sample collection personnel.

3.1.5 Decision Rule

The fifth step in the DQO process is to (1) define the parameters of interest that characterize the population, (2) specify the action level, and (3) integrate previous DQO outputs into a single statement that defines the conditions that would cause the decision-maker to choose among AAs. The decision rule typically takes the form of one or more "If…then" statements describing the action or actions to take if one or more conditions are met.

The decision rule must be specified in relation to a parameter that characterizes the population of interest. It is assumed that final rinse solutions from the tank system lines will be relatively homogenous, aqueous solutions with low concentrations of contaminants of concern. Therefore, the parameter of interest will be the true mean concentration of the contaminants of concern. Because it is not possible to determine the value of the true mean using sample data, a statistic is usually chosen upon which the actions are based. In the case of this sampling effort, only two samples will be collected from the process waste line and only one sample will be collected from the new unused section of line. Therefore, individual results will be compared to each other and the action levels to determine if an action level may be exceeded.

The decision rules are based on the closure plan requirements that specify that hazardous waste cannot be left in place following closure and that the risks posed by the concentrations of measurable contaminants are acceptable. Therefore, the decision rules are:

- *If* the difference between the concentration of a metal constituent detected in analyses of the samples collected from the triple-rinsed process waste line and the concentration detected for the same constituent in the new unused (control) line is greater than the maximum concentration of contaminants for the toxicity characteristic listed, *then* additional decontamination measures will be considered.

- *If* the difference between the concentration of any applicable metal constituent detected in analyses of the water samples collected from the triple-rinsed process waste line and the concentration detected for the same constituent in the new unused line is greater than the action level specified in the closure plan, *then* additional decontamination steps may be undertaken.

3.1.6 Decision Error Limits

The sixth step in the DQO process is to minimize uncertainty in the data by specifying tolerable limits on decision errors. The limits are used to establish performance goals for the data collection design. The possible range for the parameter of interest is determined, and the types of decision errors and the potential consequences of the errors are defined.

Decisions are based on measurement data; however, the data provide only an estimate of the true state of the media being characterized. Because of this, decisions could be based on data that may not accurately reflect the true state of the media. Therefore, if the data are not a true representation of the residual characteristics, the decision-maker could make a decision error. The decision-maker must define tolerable limits on the probability of making a decision error.

Typically, the probability of making a decision error is controlled by adopting a scientific approach and the use of statistical sampling. As stated earlier, decisions for this sampling effort will not be based on the use of a statistic (e.g., the sample mean), rather the decisions will be based on examining individual concentrations and comparing them to each other and the action levels. Therefore, a thorough discussion of statistical sampling is not warranted for these DQOs. The results obtained from the samples described

in this SAP will be used to support decisions regarding closure of the TFF. Other TFF closure sampling activities will be based on statistical sampling designs that are based on a desired level of decision error.

3.1.7 Design Optimization

The last step in the DQO process is design optimization. The purpose of design optimization is to identify the best sampling and analysis design that satisfies all of the previous steps in the process. The activities involved in design optimization include:

- Reviewing the outputs of the first six steps and existing environmental data
- Developing general data collection design alternatives
- Formulating a mathematical expression needed to solve the design problem for each data collection design alternative
- Selecting the optimal number of samples to satisfy the DQOs for each data collection design alternative
- Selecting the most resource-effective data collection design that satisfies all the DQOs.

After these activities are completed, the operational details and theoretical assumption of the selected design are documented in the SAP.

The outputs of the first six steps have been discussed previously. Environmental data are available for the WM-182 and WM-183 tank system contents before decontamination activities began. However, these data cannot be used to develop information concerning the possible range of concentrations (or values) that will be measured for the constituents of interest. As no data exist for characterization of the process waste lines following decontamination activities, only assumptions of parameter variability and possible concentration ranges can be made.

The planning assumptions for the project include some related to sample collection. There will be vertical and horizontal process waste lines available to elute rinsate for sample collection. Therefore, the samples of process waste line rinsate that will be analyzed for metals will be assumed representative of all process waste lines remaining in the tank systems.

3.2 Data Quality

The data generated from the characterization of the triple-rinsed process waste lines from Tanks WM-182 and WM-183 will be used to evaluate parameters that are pertinent to the closure process. Each parameter to be evaluated requires data of specific quality. To demonstrate compliance with the closure requirements, the chemical measurement data obtained must be of high quality. Laboratory analytical procedures and laboratory data reporting will adhere to the following QA/QC standards with minor modifications:

- SW-846 for metals analysis data (EPA 1996)

As stated, the water allowed to equilibrate and poured from the process waste line and new unused line will be tested using EPA SW-846 methods with minor modifications. The SW-846 methods will be followed as published except as modified by the SOWs used by the INEEL Sample Management Office (SMO). The INEEL SMO laboratory SOWs impose required quality controls, including corrective actions

if a quality control parameter is not within control limits. The specified corrective actions are more explicit than the published SW-846 methods, which simply imply a corrective action should be taken. These quality control requirements provide a more consistent data set for INEEL data users. The INEEL SMO SOWs require that the SW-846 method be performed as published (with specific QC requirements) unless modifications are required due to the radioactivity of the sample. It is anticipated that the water samples will have a low enough radioactivity to allow normal processing of the sample. If the sample has higher radioactivity, smaller sample aliquots may be required to protect the health and safety of laboratory personnel. If insufficient sample is collected from the lines, due to volume limitations of the length of line filled with water, sample aliquots smaller than those called for in the SW-846 methods will also result. The effects of smaller sample aliquots is an adjusted detection sensitivity for the analytical methods. That is, a smaller aliquot results in a higher detection limit. In all cases where the sample aliquot is not as specified in the SW-846 methods, the laboratory will document the deviation in the sample analysis narrative provided with the data. The laboratory staff and their experience will be relied upon, in conjunction with the PM and PQAO, to make the best decisions for analyses where deviations may arise.

Table 2 provides a summary of all analyses planned for the samples collected from the decontaminated process waste line and the new unused line. They include the corresponding analytical method requirements for each analysis and the reporting procedure requirements when they differ from the analytical procedure. The laboratory will flag non-conforming data as appropriate and required in the analytical laboratory SOW.

Table 2. Summary of analysis requirements for the Tank WM-182 and Tank WM-183 process waste line rinsate samples.

Requested Analysis for WM-182 and WM-183 Solids	Analysis Method	Reporting Requirements
Total Metals		
Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn	3010A Sample Preparation (all elements except Ag, Sb, and Hg)	ER-SOW-156
	3015 Sample Preparation (Ag and Sb)	Tier 1
	6010B (all metals except As, Hg, and Se)	
	7060A As	
	7740 Se	
	7470A Hg	

4. DOCUMENTATION AND DATA MANAGEMENT

Documentation involves the recording of all events relating to field and laboratory activities. Typical field documentation will include field logbooks, sample labels, and COC forms. Sample handling procedures include COC, radiological field screening, sample- and investigation-derived waste packaging, and transport of samples to the laboratory.

4.1 Documentation

To ensure that all sampling, analysis, and data reporting activities are conducted in accordance with project DQOs and all appropriate safety procedures, adequate documentation of each event must be completed. Therefore, all field activities related to sample collection, site safety, and sample custody must be recorded by the FTL and/or the field team members in the field logbook. In addition, all laboratory activities relating to sample custody, sample preparation, sample analysis, and data reporting must also be completely recorded to ensure that laboratory data can be confidently assigned to field sample points. The PE will observe sampling activities and will be provided with the logbooks, COC forms, analytical results, and any other documentation generated during closure activities that is required to certify the closure.

The laboratory will perform all functions required for WM-182 and WM-183 process waste line samples in accordance with an appropriate laboratory QAP. In addition, project management and other key project staff may contact the laboratory personnel and obtain a copy of the laboratory QAP and/or visit the facility to ensure that laboratory procedures meet the project-specific goals.

4.1.1 Field Operations Records

The following subsections provide a summary of requirements for adequate field documentation. All field documentation, document control, and daily updating of field logbooks and field materials will be the responsibility of the FTL or designee.

4.1.2 Video Inspection and Photo Quality

Video and still photographs will be taken of the waste lines to document the condition and amount of corrosion or passive layer of contamination present. The quality of the video and photographs should be such that without magnification all visible contamination except for residual staining form waste consisting of light shadows, slight streaks or minor discoloration shall be evident. Also, all waste or debris in cracks, crevices, and pits shall be visible if they cover more than 5% of each square inch of surface area.

4.1.3 Sample Container Labels

The following specific information will be placed on the sample label for each sample and recorded on the COC or internal tracking forms:

- Project name
- Date of sample collection
- Time of sample collection
- Name, or initials, of sampling team member

- Analysis request(s)
- Radiological field measurement
- Field identification number.

4.1.3.1 Sample Numbering Scheme. Each sample will be assigned a unique identification number. A systematic character identification code will be used to identify the samples. Uniqueness is required for maintaining consistency and preventing the same identification code from being assigned to more than one sample.

The following sample designation will be used in the field logbook and on sample labels:

- First three characters—Project code (for example, CP1)
- Fourth, fifth, and sixth characters—Sequential number used for designating the project request (for example, 001)
- Seventh and eighth characters—Sequential number identifying the sample location (for example, 01)
- Ninth and tenth characters—Sequential number identifying the sample matrix (for example, 01)
- Eleventh and twelfth characters, (if applicable)—Code used for identification of analyses. This code is assigned for database tracking purposes. However, the code may not be printed on the bottle label because the label itself may specifically state the constituents to be analyzed.

As an example, CP10010101, would indicate that the sample is for the CP1 project (closure plan sampling project); that it is the first request (001 to indicate the request to sample a WM-182 tank process line); that it is the first sample (01 of 5); and that it is the liquid matrix (01 of 2).

4.1.3.2 Field Sampling Logbooks. Field logbooks are legal documents; they are the written record for all field data gathered, field observations, field equipment calibrations, samples collected for laboratory analysis, and sample custody. They also are maintained to ensure that field activities are properly documented as they relate to site safety meetings and that site work is conducted in accordance with the health and safety procedures. Field logbooks will be bound, and they will contain consecutively numbered pages. All entries in field logbooks will be made using permanent ink pens or markers. All mistakes made as entries will be amended by drawing a single line through the entry and then initialed and dated by the person making the correction. At a minimum, the following entries will be made to the field logbook:

- Identification of all sampling team members
- References to field methods used to obtain samples, field data, etc.
- Location and description of each sampling point
- Types, numbers, and volumes of samples (when observable)
- Date of sample collection, time of sample collection, and sample identification

- Date and time of sample shipping, or transfer of sample custody
- Observed weather conditions
- All field measurements
- Any deviations from the standard or expected procedure
- COC form numbers and copies of the COC forms.

4.1.3.3 Chain of Custody (COC) Record. COC procedures will begin immediately after collection of the first sample. At the time of sample collection, the sampling team will initiate a COC form for each sample. All samples collected will then remain in the custody of a member of the sampling team until custody is transferred to the laboratory SC. Upon receipt at the laboratory, the SC will review sample labels and the COC form to ensure completeness and accuracy. If discrepancies are noted during this review, immediate corrective action will be sought with the sampling team member(s) identified on the COC as delivering the samples. If errors cannot be corrected with the sample team members, the PQAO or the PM will be sought to correct sample labeling or COC errors.

Pending successful corrective action, the laboratory SC will sign and date the COC form signifying acceptance of delivery and custody of the samples. The sampling team will retain the original signed COC and will note the time of sample custody transfer in the field logbook. Sufficient copies of COCs will be made at the time of sample delivery to ensure that appropriate personnel have copies. The laboratory will maintain possession of the original COC form until completion of sample analysis and will maintain one of the three COC copies for the term of data storage at the laboratory. Only at the time of disposal of laboratory data, or transfer to the HLW Program ARDC, will the original COC form leave the laboratory's control. The original COC form will be returned to the project file maintained by the PM or the PQAO along with the final data package deliverable.

4.1.4 Laboratory Records

Laboratory records are required to document all activities involved in sample receipt, processing, analysis, and data reporting. The following subsections describe the laboratory records that will be generated for this project.

4.1.4.1 Sample Data. These records contain the times that samples were analyzed to verify that they met holding times prescribed by the analytical methods. Sample data records should include information on the total number of samples analyzed in a given day, location of sample analysis (i.e., instrument identification number), any deviations from analysis SOPs or methods, and time and date of analysis. Corrective action steps taken to rectify situations that did not conform to laboratory SOPs or analytical methods (including steps taken to seek additional sample material if required) should also be noted in these records.

4.1.4.2 Sample Management Records. Sample management records document sample receipt, handling and storage, and scheduling analyses. The records verify that the COC and proper preservation were maintained, reflect any anomalies in the samples (such as receipt of damaged samples), note proper log-in of samples into the laboratory, and address procedures used to prioritize samples received to ensure that holding time requirements will be met.

4.1.4.3 Test Methods. Unless analyses are performed exactly as prescribed in the analytical methods or laboratory SOPs, this documentation describes how the analyses were carried out by the

laboratory. Items to be documented include sample preparation and analysis, instrument standardization, detection and reporting limits, and test-specific QC criteria. Documentation demonstrating laboratory proficiency with each method used could also be included in this category.

4.1.4.4 QA/QC Reports. These reports will include general QC records, such as initial demonstration of capability of individual analysts to conduct specific analyses, instrument calibration, routine monitoring of analytical performance (e.g., control charts), calibration verification, etc. Project-specific information from the QA/QC checks such as blanks (e.g., field, reagent, and method), spikes (matrix, matrix spike duplicate, and surrogate), calibration check samples (e.g., zero check, span check, and mid-range check), replicates, and splits should be included in the QA/QC reports to facilitate data quality analysis. Specific requirements for the reporting format and quantity and types of QA/QC monitoring will be specified in the analytical SOW to the laboratory.

4.2 Document Control

Document control consists of the clear identification of all project-specific documents in an orderly form, secure storage of all project information, and controlled distribution of all project information. Document control ensures controlled documents of all types related to the project will receive appropriate levels of review, comment, and revision as necessary. It also ensures that all documents that will ultimately affect project QA are correct before use.

The PM is responsible for properly maintaining active project files. Upon completion of the WM-182 and WM-183 post-decontamination process waste line characterization, the PM will transfer all hard-copy information and documentation developed from the project to the HLW Program ARDC for archiving as appropriate. Hard-copy information and documentation includes field logbooks, field and laboratory COC forms, laboratory reports and data, engineering calculations and drawings, final design reports, and all other technical reports related to the project. Copies of all analytical data and/or final reports will also be retained in the laboratory files, and at the discretion of the laboratory manager or laboratory QA officer, will be stored on computer disk and in hard-copy form for a minimum of five years from point of generation. Data will be made available for retrieval by authorized project staff from the HLW Program ARDC and the laboratory archives upon request.

4.3 Data Management

Data management consists of controlling the data generated and other data collected for use (e.g., existing data) during this sampling and analyses effort. All data will be controlled using the document control processes described in Section 4.2 and in accordance with all existing MCPs concerning control and archival of electronic data. Data will be made available for retrieval by authorized project staff from the HLW Program ARDC and the laboratory archives upon request.

5. SAMPLING PROCESS DESIGN

Sample handling for the characterization of the water samples collected from the process waste lines removed from the WM-182 and WM-183 tank system may require special procedures due to potentially encountering high radiation fields near the process waste lines. The following sections outline the specific sampling process design for this effort.

5.1 Sample Collection

The overall purpose of the process waste line sampling and analysis effort is to provide data that will be used to contribute to the determination that TFF decontamination activities have resulted in the HWMA/RCRA closure standards being met.

The HWMA/RCRA performance standards include demonstrating that no hazardous waste remains in the closed unit (i.e., the TFF) and incorporating action levels to demonstrate clean closure of RCRA units. The effort described in this SAP contributes to the overall requirement for samples of the WM-182 and WM-183 post-decontamination tank-system residuals that are to be collected and analyzed for a group of parameters to establish data to satisfy HWMA/RCRA requirements for TFF site closure. Previous sampling efforts undertaken during process operations and in the initial characterization sampling have yielded some process-specific data. However, these data only pertain to liquids present in the tank during sampling; therefore, these data are not applicable for determining the contributions of the post-decontamination concentrations in the tanks in meeting the criteria for closure of the TFF under HWMA/RCRA. No data exist regarding the post-decontamination concentrations of RCRA constituents in tank system components. Therefore, sampling the post-decontamination residuals is required to obtain these data.

5.1.1 Pre-Sampling Meeting

Before sampling takes place, project personnel will meet to ensure the sampling and analysis can be performed in a safe manner and will provide the project with usable data. The following personnel are expected to be present at the meeting: the sampling team, a laboratory representative (required only if it is anticipated that sample analyses will take place in the Remote Analytical Laboratory [RAL]), the PQAO, health and safety personnel, project management, the EA Closure PM, an independent PE, and personnel responsible for risk and dose assessments.

Sampling team members must be trained in the procedures chosen for sampling the process waste lines as well as appropriate INTEC and INEEL ES&H procedures and policies.

5.1.2 Sample Location and Frequency

Samples from the process waste line and the new unused line will be collected by directly filling the lines with de-ionized water, allowing the water to equilibrate in the pipe for 30 minutes, and then directly filling two bottles for metals analysis from the process waste line and one bottle for metals analysis from the new unused line. The sample bottle and preservation requirements for sample collection are summarized in Table 3.

5.1.3 Sample Preservation

Sample preservation is conducted to ensure that target analytes do not escape from field samples or become chemically attached to sample containers before analysis. Typical sample preservation activities include the addition of acids to ensure that metals remain in solution.

Table 3. Summary of sample collection, holding time, and preservation requirements.

Analysis	Sample Medium	Volume	Container Type[a]	Holding Time	Preservative
Total metals	Water	1,000 mL	High-density polyethylene bottle	Analyze within 6 months, Hg analyze within 28 days[b]	HNO3 to pH < 2[b]

a. It is highly recommended that a certificate of cleanliness be obtained for all lots of sample containers used.

b. EPA SW-846 Chapter 2

5.1.4 Field Radiological Control Screening

Because of the potential intensity of radiation fields around the process waste lines, all sampling and analysis activities will comply with INEEL MCPs. The radiological controls and personnel monitoring requirements established for this sampling effort, and the subsequent sample transfer, are based on radiation exposure rates calculated using process data obtained during the operation of Tanks WM-182 and WM-183. These exposures rates will be used to implement action levels that will help to ensure that all work activities and personnel exposure to direct radiation are maintained as low as reasonably achievable (ALARA) (INEEL 2000a). If the action levels are low enough, field manipulation of sampled material may proceed in the sample collection and staging area. Following an evaluation by the IH, the RCT will use hand-held instrumentation to screen beta and gamma radiation in the sample collection area.

These direct radiation screenings will be used to determine whether the sample is suitable for handling and shipping activities or if it must be prepared for transport and delivery to the RAL. All activities relating to the post-decontamination characterization of the WM-182 and WM-183 tank systems will be done in accordance with requirements of PRD-183, "INEEL Radiological Control Manual," (INEEL 2000a). It is anticipated that radiation levels will be low enough that samples collected from the lines can be directly poured into the sample collection containers.

5.1.5 Sample Containers

It is expected that the water from the process waste line and new unused line will be collected by pouring rinsate directly into the sample containers specified in Table 3.

5.1.6 Sample Transport

Upon completion of sample retrieval from the process waste line and new unused line, the sealed high-density polyethylene container will be scanned by a RCT using hand-held radiation survey equipment. If the activity of the material retrieved from the pipe allows analysis at an off-site laboratory, the pre-labeled bottles of the sizes defined in Tables 3 will be placed in a shipping cooler containing sufficient blue ice such that the temperature of the container can be maintained at approximately 4°C ± 3°C. The completed COC form, prepared during sample collection, will be taped inside the cooler to document transfer of custody of the samples by the sampling team member or FTL. Custody seals will be taped to the shipping cooler to ensure the integrity of the COC between the INEEL and the analytical laboratory.

Field blanks will not be introduced during sample collection. Field blanks are analyte-free water, which is poured into a sample container at the sample collection site to check cross-contamination during sample collection and shipment. Field blanks are often not collected during waste sampling activities because the very low level of cross contamination detectable using field blanks would not affect a decision concerning data obtained from measurements on a concentrated waste. In the case of this

sampling, as the material being sampled is the water samples from the lines, the analytes of interest are only metals, it is a one-time sampling event, and the sample collection will be accomplished indoors. Thus, data concerning cross-contamination would not be very useful for either data interpretation or improving sampling QA practices in subsequent sample collection episodes.

5.1.7 Waste Management

Wastes generated as a result of the post-decontamination characterization of the WM-182 and WM-183 process waste line rinsates will include laboratory wastes. Field wastes in the form of paper towels and other wastes associated with the sample apportionment activities (e.g., sample volume in excess of the volume required to fill the sample containers) will be generated as a result of sample collection. The INEEL WGS group will ensure disposition of waste material is in compliance with the approved HWMA/RCRA Closure Plan and that applicable paperwork is completed. All samples and analysis wastes will be disposed in accordance with INEEL MCP-2864, "Sample Management" (INEEL 1999a). The WGS WTS will ensure compliance with the applicable HWMA/RCRA requirements and PRD-166, "PEW Chemical Acceptance Criteria" (INEEL 1999b).

6. SAMPLING PROCEDURES

The potential to encounter high radiation fields near the process waste line may preclude the use of standard sample collection techniques. It is anticipated, however, that the sample collection containers can be directly filled by sampling personnel.

6.1 Sample Collection Procedures

Specific SOPs for sample collection will be developed and used to collect samples from the process waste line and the new line. The decision to resample will not be made without authorization from the appropriate responsible facility, operational, and program personnel located at the job site.

One section of process waste line has been cut and removed from one of the tank systems. In addition, a section of line with similar dimensions will be used to establish the background concentration of metals contributed by unused stainless steel. These sections of line will be filled with water, allowed to equilibrate for 30 minutes, sampled, and analyzed for total metals.

Table 4 provides a summation of the samples that are anticipated to be collected during the sampling efforts. The table provides an estimate of the anticipated number of samples, collection dates, and the analytes to be requested for each sample.

Table 4. Anticipated sample collection from each of the WM-182 and WM-183 tank systems.

Analysis	Estimated Number of Samples From the Waste Line	Representative Section of Unused Line	Matrix	Analytes of Interest	Dates of Collection
Total Metals	2	1	Water	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn	TBD

a. TBD = To be determined.

7. ANALYTICAL METHODS

To ensure that data of acceptable quality are obtained from the characterization of the process waste lines from the WM-182 and WM-183 tank systems, standard EPA laboratory methods will be used to obtain project laboratory data. Analytical measurements and the reporting protocols that will be used to determine metals are outlined in Table 5. Determinations for total metals will be performed by the methods presented in *Test Methods for the Evaluation of Solid Waste, Physical Chemical Methods* (EPA 1996) and listed in Tables 5 and 6.

Tables 7 and 8 provide a summary of method-specific requirements that will be followed by the analytical laboratory to the extent possible given the sample restrictions. Any deviations from this information will be fully documented, and the PQAO and the PM will be informed of deviations.

Table 5. Analytical method source documents and method descriptions.

Inorganic and Organic Determination Method[a]	Description
3015	Microwave assisted acid digestion of aqueous samples and extracts
3010A	Acid digestion of aqueous samples and extracts for total metals for analysis by FLAA or ICP spectroscopy
6010B	Inductively Coupled Plasma-Atomic Emission Spectroscopy
7060A	Arsenic (atomic absorption, furnace technique)
7470A	Mercury in liquid waste (manual cold vapor technique)
7740	Selenium (atomic absorption, furnace technique)

a. EPA (1996).

Table 6. Required analytical activities and method holding times.

Parameter	Matrix	Activity	Holding Time
Total Metals	Water	Analysis	180 days; 28 days for mercury

Table 7. Sample preparation, analytical methods, and method detection limits—liquids.

Analysis	Recommended Detection Limit in mg/L[a]	Preparation Method	Analysis Method
Total Metals			
Aluminum	0.3	SW-846 3010A	SW-846 6010B
Antimony	0.2	SW-846 3015	SW-846 6010B
Arsenic	0.01	SW-846 3010A	SW-846 7060A
Barium	0.01	SW-846 3010A	SW-846 6010B
Beryllium	0.002	SW-846 3010A	SW-846 6010B
Cadmium	0.02	SW-846 3010A	SW-846 6010B
Calcium	0.07	SW-846 3010A	SW-846 6010B
Chromium	0.05	SW-846 3010A	SW-846 6010B
Cobalt	0.05	SW-846 3010A	SW-846 6010B
Copper	0.04	SW-846 3010A	SW-846 6010B
Iron	0.04	SW-846 3010A	SW-846 6010B
Lead	0.3	SW-846 3010A	SW-846 6010B
Manganese	0.01	SW-846 3010A	SW-846 6010B
Mercury	0.002	SW 846 7470A	SW-846 7470A
Nickel	0.1	SW-846 3010A	SW-846 6010B
Selenium	0.02	SW-846 3010A	SW-846 7740
Silver	0.05	SW-846 3015	SW-846 6010B
Thallium	0.3	SW-846 3010A	SW-846 6010B
Vanadium	0.05	SW-846 3010A	SW-846 6010B
Zinc	0.01	SW-846 3010A	SW-846 6010B

a. The method detection limits from the post-decontamination water rinsates is estimated by multiplying published instrument detection limits by ten.

8. INSTRUMENT CALIBRATION PROCEDURES

To ensure that sampling and analysis activities obtain the most accurate and precise information possible, field equipment and laboratory instrumentation must be calibrated according to manufacturer specifications and according to the appropriate analytical method specifications.

8.1 Laboratory Instrument Calibration

Laboratory instrumentation will be calibrated in accordance with each of the specified analytical methods (Table 5). The laboratory QAP shall include requirements for calibrations when specifications are not listed in analytical methods. Calibrations that are typically not called out in analytical methods include ancillary laboratory equipment (e.g., analytical balances, pipettes, pH meters) and verification of reference standards used for calibration and standard preparation. Laboratory documentation will include calibration techniques and sequential calibration actions, performance tolerances provided by the specific analytical method, and calibration dates and frequency. In addition, records for all laboratory-prepared standards will be maintained and provided with each data deliverable. Standard reference materials used to perform calibration checks associated with inorganic target analytes will be prepared using an independent source for the standard materials from that used for preparation of the calibration standards. The results of these calibration checks will be reported with each data deliverable.

All analytical methods prescribed in Table 5 have specifications for equipment checks and instrument calibrations. The laboratory will comply with all method-specific calibration requirements for all requested parameters. If a failure of instrument calibration or equipment is detected, the instrument will be re-calibrated, and all affected samples will be analyzed using an acceptable calibration.

8.2 Field Equipment Calibration/Set-up

The RCT will be responsible for calibration of all radiological monitoring equipment and the placement and handling of all telemetry dosimeters (if used). The IH will be responsible for the measurement and evaluation of dosimeter results. All field calibrations will be documented in a field instrument calibration/standardization logbook as described in MCP-231, “Logbooks for the ER and D&D&D Projects” (INEEL 2000b).

8.3 Preventative Maintenance Procedures and Frequency

Field equipment will be managed using a calibration program compliant with MCP-2391 requirements (INEEL 2001). All laboratory equipment will be maintained to a level such that each piece of equipment and each laboratory instrument can meet method-specific QA/QC tolerances. Maintenance will be performed under the supervision of qualified personnel on all laboratory instrumentation in accordance with the manufacturer’s specifications, laboratory QAP, and/or SOPs.

Preventive maintenance of field equipment will be conducted in accordance with appropriate facility SOPs. *EPA Requirements for Quality Assurance Project Plans* (EPA 1998) requires that all activities not governed by specific analytical procedures be completed under approved SOPs. If SOPs governing the inspection and maintenance of sampling equipment do not presently exist, they will be developed to ensure that sampling activities are conducted using equipment that is performing within manufacturer- or design-specifications.

Equipment used by INTEC ESH&Q oversight personnel will be evaluated, maintained, and operated within the manufacturers’ specifications for each type of field or monitoring equipment.

9. DATA VALIDATION AND REPORTING

The generation of data in the field and by the laboratory is the first of several steps in evaluating conditions at a project site. After the data are generated, a series of evaluations and data reduction steps must be conducted to ensure that the data are acceptable and that the information is in a form that is usable by the end users.

9.1 Data Reduction

Data reduction is the process of converting raw data or instrument data into a usable form for evaluation by project personnel. Reduction of environmental data will take place at the laboratory. The data reduction activities performed at the laboratory convert the data into a form more usable for interpretive purposes for environmental risk assessment and verification of closure design.

Laboratory data reduction involves converting the outputs of the analytical instruments into sample and QC results. Laboratory reduction will be performed as defined in the analytical method. Laboratory deliverables include raw data and reduced data. This form of laboratory reporting will ensure (1) complete documentation of all aspects of laboratory analysis, (2) permit independent verification of reported results, (3) provide a form of data that is technically and legally defensible, and (4) ensure that end-data users can be completely confident in the results they deem usable for their intended purpose.

Further data reduction may be necessary for use at the project level. When this is necessary, project management will determine the final data uses and parameter needs and will provide data sets in the form that project personnel require to complete their tasks. Examples of additional data reduction tasks include unit conversions and use of the data to perform sum-of-the-fractions calculations defined in 10 CFR 61.55(a)(7) (2001).

Scientists and regulators within the EPA, DOE-HQ, DOE-ID, and Idaho DEQ may review the data to ensure compliance with HWMA/RCRA and DOE closure requirements. Individual regulators submit their requests to the PM for any data sets required to evaluate the post-decontamination characterization effort. Project management will provide requested information to regulators in the most usable form possible.

9.2 Data Validation

Data validation is the portion of the DQA process that is used to determine whether or not the data are technically and legally defensible, reliable, and meet the DQOs of the project. Analytical data validation is the comparison of analytical results versus the requirements established by the analytical method. Validation involves evaluation of all sample-specific information generated from sample collection to receipt of the final data package by the PM. The applicable analytical method QC guidelines will be used to validate the data. Additional steps of the DQA process are discussed in Section 9.3.

The final product of the validation process is the validation report. The validation report communicates the quality and usability of the data to the decision-makers. The validation report will contain an itemized discussion of the validation process and results. Copies of the data forms annotated for qualification as discussed in the validation report will be attached to the report.

9.3 Data Quality Assessment

Steps of the DQA process involve data plotting, testing for outlying data points, and statistical hypothesis testing relative to the null and alternative hypotheses stated in the DQOs. Usually, the outcome of the DQA process is a statement that the statistical hypothesis testing suggests that the null hypothesis is accurate, that the null hypothesis has been rejected, or that not enough data exist to make a determinative conclusion based upon the hypothesis test used. As no statistical hypothesis is being tested during this sampling, the DQA process will involve a determination as to whether or not the data can be used for their intended purpose or whether additional data collection for the process waste lines is recommended.

As stated in the discussion of completeness, data that are not necessarily invalid may be flagged during the data validation process. Flagged data are reviewed during the DQA process to determine whether or not the validation flags affect the intended use of the data. The determination of whether flagged data are used in decision-making is documented in the DQA report.

9.4 Data Use

Following data validation and DQA, the statistics generated during DQA will be used to make decisions relative to HWMA/RCRA clean closure and DOE Tier 1 closure.

9.5 Reporting

The laboratory may use its standard report forms when assembling the final Tier 1 data package documentation. However, each deliverable must conform to the criteria specified in the following references:

- Inorganic Data: Tier 1 deliverable as defined in ER-SOW-156 (INEL 1996)

The Tier 1 data deliverables include all pertinent raw data, preparation notes, standard preparation, instrument printouts, and standard reference material certificates. The documents are used to establish technical and reporting standards only; their use does not imply the involvement of the Environmental Restoration Program in the TFF closure project. The SOWs that were prepared by the INEEL SMO have become the standard means by which analytical data deliverable requirements are defined by INEEL projects to both the INEEL laboratories and commercial laboratories used by the INEEL.

10. INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

To adequately assess the quality of sampling techniques, the cleanliness of sampling and shipping methods, and to help assess laboratory accuracy and precision, field QA/QC samples are submitted with natural samples at the time of custody transfer to the laboratory. Sampling conditions during the WM-182 and WM-183 process waste line characterization may be unconventional. If high radiation fields are encountered, field QC will be difficult to incorporate into the sampling process. However, depending on conditions, some field QC can be applied and will be collected. For this reason, it will be critical for laboratory QA/QC procedures and tolerances to be closely followed and met whenever possible. The following sections outline specific QC checks that will take place for this project.

10.1 Laboratory Quality Control

Laboratory QA/QC procedures and strict adherence to analytical method tolerances are critical to obtaining high-quality laboratory data. Each analysis conducted will strictly adhere to all QA/QC procedures, QA/QC control limits, and method-specific corrective actions.

10.2 Field Quality Control

Field QC is usually accomplished by using approved sampling procedures and monitored by using trip blanks and field blanks. As stated earlier, neither trip nor field blanks are appropriate for this sample collection effort.

10.3 Inspection/Acceptance Requirements for Supplies and Consumables

Disposable sampling equipment will be checked before use to ensure it is made of material appropriate for the media being sampled. Sample containers will be obtained from vendors that certify the cleaning protocol used is appropriate for the analyses to be performed on the sample. Reagents used for sample preservation will be checked to ensure they are of the appropriate grade prior to use. Inspection and acceptance of these items will be documented in field logbooks or, when certifications are provided by the manufacturer, maintained in project files to ensure availability of these records.

11. SYSTEM AND PERFORMANCE ASSESSMENTS, FREQUENCY AND CORRECTIVE ACTIONS

It is not a requirement of this SAP that a formal audit of the analytical laboratory be performed before commencing with the WM-182 and WM-183 process waste line characterization effort. However, if deviations from the procedures outlined in this SAP are suspected during analysis, the PM and the PQAO should review the laboratory procedures that were used to obtain project data. In addition, a meeting at the laboratory is encouraged to examine all procedures used, to examine the facilities that will be used to complete data gathering activities, and to discuss the technical project activities and intended data uses with laboratory personnel.

11.1 System and Performance Assessments

A system assessment is an evaluation of an entire system to ensure it will meet the requirements of the project. An example of a system assessment is an on-site laboratory audit that ensures the sample receiving, sample storage, sample analysis, data reduction, and documentation procedures used at the laboratory will meet the requirements of the project. A performance assessment is the evaluation of the performance of one aspect of a system. An example of a performance assessment is the insertion of performance evaluation samples to test the laboratory system. Performance evaluation samples are samples containing analytes of interest at known concentrations.

11.2 Corrective Action

Corrective action procedures are implemented whenever sampling, field monitoring, or laboratory analysis results do not meet the required QA/QC standards. The types of corrective action applicable to environmental analysis are field corrective action(s) and laboratory corrective action(s).

11.2.1 Laboratory Corrective Action

The laboratory manager, the laboratory QA officer, laboratory analysts, the PM, and the PQAO will be responsible for ensuring that all laboratory QA/QC procedures are followed. Situations requiring corrective action and the type of correction required will be as stated in the analytical method or the laboratory SOW. The laboratory will use internal QAPs and SOPs to complete all corrective actions identified both internally and externally. Completion of corrective actions will require notification to the PM or the PQAO of any laboratory situation that may affect the usability of the data. If notified of a laboratory non-conformance for which the laboratory seeks the project's required corrective action, the PQAO will:

- Notify the PM of the situation
- Devise a reasonable corrective action in conjunction with the laboratory staff and the PM
- Formally request the laboratory to implement the corrective action.

The PQAO and the laboratory QA officer will be responsible for monitoring the effectiveness of all corrective actions. The PQAO will report directly to the PM and INEEL management regarding problems or deviations observed, corrective actions proposed, and the effectiveness of ongoing corrective actions.

11.2.2 Field Corrective Action

The FTL and PM are responsible for ensuring all field procedures are followed completely and that field personnel are trained adequately. The FTL and the PM must document situations that may impair the usability of the samples and/or data in the field logbook. The FTL will note any deviations from the standard procedures for sample collection, COC, sample transport, or any other monitoring that occurs. The FTL will also be responsible for coordinating all activities relating to the use of field monitoring equipment, such as dosimeters and IH equipment. INTEC ESH&Q oversight personnel will provide any notations to the logbook to document non-compliant measurements taken during field sampling. Ultimately, the PM, or the FTL (at the discretion of the PM), will be responsible for communicating field corrective action procedures, for documenting all deviations from procedure, and for ensuring that immediate corrective actions are applied to field activities.

11.3 Reports to Management

The FTL and PM are responsible for ensuring all field procedures are completely followed and that field personnel are adequately trained. The FTL and the PM must document situations that may impair the usability of the samples and/or data in the field logbook. The FTL will note any deviations that occur from the standard procedures for sample collection, COC, sample transport, or any other monitoring. The FTL will communicate any deviations to the EA Closure PM, who will discuss these deviations with the independent PE to ensure any deviations are minor and do not affect implementation of the approved closure plan. The FTL will also be responsible for coordinating all activities relating to the use of field monitoring equipment (e.g., dosimeters and industrial hygiene equipment). The RCT and the IH will provide any notations to document out-of-compliance measurements taken during field sampling. Ultimately, the PM or the FTL (at the discretion of the PM) will be responsible for the effective communication of field corrective action procedures, for documenting all deviations from procedure, and for ensuring that immediate corrective actions are applied to field activities.

12. REFERENCES

10 CFR 61, 2001, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, Nuclear Regulatory Commission, Office of the Federal Register, National Archives and Records Administration, pp.153-179, January.

29 CFR 1910, 2001, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Occupational Safety and Health Administration, Department of Labor, Office of the Federal Register, National Archives and Records Administration, pp.73-880, July.

40 CFR 261, 2001,"Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, U.S. Environmental Protection Agency, Office of the Federal Register, National Archives and Records Administration, pp. 141-179, July.

42 USC 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976."

DOE-ID, 2001, *Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tanks WM-182 and WM-183*, DOE/ID-10802, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho, November 19.

EPA, 2001, *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5*, EPA/240/B-01/003, Office of Environmental Information, Washington D.C., March.

EPA, 2000, *EPA Guidance for the Data Quality Objectives Process, EPA QA/G-4*, EPA/600/R-96/055, Office of Environmental Information, Washington D.C., August.

EPA, 1998, *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5*, EPA/600R-98/018, Office of Research and Development, Washington, D.C., February.

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Portage Environmental, Inc., 2001, *Tier I Closure Plan for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility at the INEEL*, INEEL/EXT-01-00576, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho (in print, expected January 2002).

State of Idaho, 1983, "Hazardous Waste Management, "Idaho Statute, Title 39, " Chapter 44, "Hazardous Waste Management," (also known as the Hazardous Waste Management Act of 1983).

Appendix A

Cross-Reference between EPA QAPP and FSP Requirements and the Sections of this SAP

Cross-Reference between EPA QAPP and FSP Requirements and the Sections of this SAP

Table A-1 compares Quality Assurance Program Plan (QAPP) elements provided in the Environmental Protection Agency's (EPA's) *Requirements for Quality Assurance Project Plans EPA QA/R-5* (Interim Final)[c] (*EPA QA/R-5 Requirements*) and *Guidance for Quality Assurance Project Plans EPA QA/G-5* (*EPA QA/G-5 Guidance*)[d] to the 1989 EPA *Guidance for Conducting Remedial Investigations and Feasibility Studies under Comprehensive Environmental Response, Compensation, and Liability Act*[e] and to the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*. Table A-2 compares the Field Sampling Plan elements in the 1989 EPA guidance document to the *EPA QA/R-5 Requirements* and *EPA QA/G-5 Guidance* QAPP elements to the elements in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*.

a. EPA, 2001, *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5,* EPA/240/B-01/003, Office of Environmental Information, Washington, D.C March.

b. EPA, 1998, *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5*, EPA/600R-98/018, Office of Research and Development, Washington, D.C., February.

c. EPA, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, EPA/540/G 89/004, Office of Emergency and Remedial Response, Washington, D.C., July.

Table A-1. Comparison of QAPP elements in *EPA QA/R-5 Requirements* and *EPA QA/G-5 Guidance* documents to *Conducting Remedial Investigations and Feasibility Studies under CERCLA* and the elements in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*.

	EPA QA/R-5 Requirements/ EPA QA/G-5 Guidance QAPP Elements		*Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA/540/G-89/004) QAPP Elements		Applicable Sections in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*.
A.	Project Management				
A1.	Title and Approval Sheet		Title Page		Title and Approval Sheet
A2.	Table of Contents		Table of Contents		Table of Contents in INEEL Document Control Format
A3.	Distribution List		NA		NA
A4.	Project/Task Organization	2.	Project Organization and Responsibilities	2.	Project Organization and Responsibilities
A5.	Problem Definition/Background	1.	Project Description	1.	Project Description
				3.1.1.	Problem Statement
A6.	Project Task Description/Schedule	1.	Project Description	1.	Project Description
				3.1.1.	Problem Statement
				3.1.4.	Study Boundaries
A7.	Quality Objectives and Criteria	3.	QA Objectives for Measurement	3.	Quality Objectives and Criteria for Measurement Data
A8.	Special Training Requirements/Certification		NA		NA
A9.	Documentation and Records		NA	4.	Documentation and Data Management
B.	Measurement/Data Acquisition				
B1.	Sampling Process Designs (Experimental Designs)		NA	3.1.	Data Quality Objectives
				5.0	Sampling Process Design
B2.	Sampling Methods Requirements	4.	Sampling Procedures	6.	Sampling Procedures
B3.	Sample Handling and Custody Requirements	5.	Sample Custody	4.1.1.	Field Operations Records
				5.1.5	Sample Containers
				5.1.6	Sample Transport
B4.	Analytical Methods Requirements	7.	Analytical Procedures	7.	Analytical Methods
				8.1.	Laboratory Instrument Calibration
B5.	Quality Control Requirements	9.	Internal Quality Control	10.	Internal Quality Control Checks and Frequency

Table A-1. (continued).

EPA QA/R-5 Requirements/ EPA QA/G-5 Guidance QAPP Elements		*Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA/540/G-89/004) QAPP Elements		Applicable Sections in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*.	
B6.	Instrument/Equipment Testing, Inspection, and Maintenance Requirements	6.	Calibration Procedures	8.	Instrument Calibration Procedures
		11.	Preventive Maintenance	10.1.	Laboratory Quality Control
B7.	Instrument Calibration and Frequency	7.	Analytical Procedures	8.	Instrument Calibration Procedures
		9.	Internal Quality Control		
B8.	Inspection/Acceptance Requirements for Supplies and Consumables	9.	Internal Quality Control	10.3.	Inspection/Acceptance Requirements for Supplies and Consumables
B9.	Data Acquisition Requirements (Non-Direct Measurements)	12.	Data Assessment Procedures	3.1.3.	Decision Inputs
B10.	Data Management	8.	Data Reduction, Validation, and Reporting	4.	Documentation and Data Management
C.	Assessment/Oversight				
C1.	Assessments and Response Actions	10.	Performance and System Audits	11.	System and Performance Assessments, Frequency, and Corrective Actions
		13.	Corrective Actions		
C2.	Reports to Management	14.	Quality Assurance Reports	11.3.	Reports to Management
D.	Data Validation and Usability				
D1.	Data Review, Validation, and Verification, Requirements	8.	Data Reduction, Validation, and Reporting	9.	Data Validation and Reporting
		12.	Data Assessment Procedures		
D2.	Validation and Verification Methods	12.	Data Assessment Procedures	9.	Data Validation and Reporting
D3.	Reconciliation with Data Quality Objectives	12.	Data Assessment Procedures	9.3.	Data Quality Assessment

N/A = Not acceptable.

Table A-2. Comparison of FSP elements in *Conducting Remedial Investigations and Feasibility Studies under CERCLA* to the *EPA QA/R-5 Requirements* and *EPA QA/G-5 Guidance* QAPP elements and the elements contained in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals*.

Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) FSP Elements		*EPA QA/R-5 Requirements*/ *EPA QA/G-5 Guidance* QAPP Elements		Applicable Sections in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-182 and WM-183 Tank Residuals.*	
1.	Site Background	A5.	Problem Definition/Background	1.	Project Description
		A6.	Project Task Description/Schedule	1.2.	Background
2.	Sampling Objectives	A5.	Problem Definition/Background	1.	Project Description
		A6.	Project Task Description/Schedule	3.1.1.	Problem Statement
				3.1.2.	Decision Statement
				3.1.3.	Decision Inputs
				3.1.4.	Study Boundaries
3.	Sample Location and Frequency	B1.	Sampling Process Designs (Experimental Designs)	3.1.7.	Design Optimization
				5.1.2.	Sample Location and Frequency
4.	Sample Designation	A9.	Documentation and Records	4.1.1.	Field Operations Records
		B3.	Sample Handling and Custody		
5.	Sampling Equipment and Procedures	B1.	Sampling Process Designs (Experimental Designs)	5.	Sampling Process Design
				6.	Sampling Procedures
		B2.	Sampling Methods Requirements		
		B6.	Instrument/Equipment Testing, Inspection, and Maintenance Requirements		
6.	Sample Handling and Analysis	B3.	Sample Handling and Custody Requirements	5.1.5	Sample Containers
				5.1.6	Sample Transport
		B4.	Analytical Methods Requirements	7.	Analytical Methods
				8.	Instrument Calibration Procedures